

CLAIMS

1. A method of manufacturing an active matrix pixel device comprising a thin film transistor (10) which includes a polycrystalline silicon channel (15) and
5 doped source/drain regions (16,17), and a PIN diode (12) which includes a p-type doped region (26) and an n-type doped region (24) separated by an amorphous silicon intrinsic region (25), the method including the steps of:
(a) – forming a plurality of polycrystalline silicon islands on a substrate (14), one of which providing the transistor channel (15), and source/drain
10 regions (16,17); and then,
(b) – depositing and patterning a layer of amorphous silicon to provide the intrinsic region (25) of the PIN diode (12) such that the intrinsic region overlies and contacts at least a part of one of the polycrystalline silicon islands which provides one of the p-type or n-type doped regions.
- 15 2. A method according to Claim 1, wherein the source/drain regions (16,17) and said one of the p-type or n-type doped regions (26,24) of the PIN diode are provided by the same polycrystalline silicon island.
- 20 3. A method according to claims 1 or 2, wherein the source/drain regions are doped n-type, and wherein the method further comprises the steps of:
(c) – depositing and patterning a layer of aluminium to define a top PIN diode contact (40) on the intrinsic region (25) of the PIN diode;
(d) – annealing the top PIN diode contact to cause aluminium ions to
25 diffuse into the underlying intrinsic region to form the p-type doped region (26).
4. A method according to claim 3, further comprising the step of:
(e) – etching away part of the top PIN diode contact (40) so as to expose the PIN diode to input light (100).
- 30 5. An active matrix pixel device comprising a plurality of polycrystalline silicon islands supported by a substrate (14), one of the islands providing a

channel (15) and doped source/drain regions (16,17) of a thin film transistor (10), the device further comprising a PIN diode (12) which includes a p-type doped region (26) and an n-type doped region (24) separated by an amorphous silicon intrinsic region (25), wherein the intrinsic region overlies
5 and contacts at least a part of one of the polycrystalline silicon islands which provides one of the p-type or n-type doped regions.

6. An active matrix pixel device according to Claim 5, wherein the source/drain regions (16,17) and said one of the p-type or n-type doped
10 regions (26,24) of the PIN diode are provided by the same polycrystalline silicon island.

7. An active matrix pixel device according to Claim 5 or 6, wherein both
the p-type and n-type doped regions of the PIN diode are provided by
15 respective ones of the polycrystalline silicon islands.

8. An active matrix pixel device according to Claim 7, further comprising a
second thin film transistor (10b) having doped source/drain regions (16b,17b)
provided by one of the islands, the doped source/drain regions (16b,17b)
20 being of an opposite conductivity type to those of the first transistor (16a,17a),
wherein the n-type doped region (24) of the PIN diode is provided by a doped
source/drain region (17a) of one transistor and the p-type doped region (26) of
the PIN diode is provided by a doped source/drain region (16b) of the other
transistor.

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9. An active matrix pixel device according to Claim 7 or 8, wherein a
transparent conductive gate (30) overlies the intrinsic region (25) of the PIN
diode separated therefrom by an insulating layer (18), the gate serving to
apply a voltage to the intrinsic region so as to control the conductivity between
30 the n-type and p-type doped regions.

10. An active matrix pixel device according to any one of Claims 5 to 7, wherein the transistor further comprises a gate electrode (20) which serves to control the current through the channel, and wherein the amorphous silicon intrinsic region of the PIN diode overlies the gate electrode.

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11. An active matrix electroluminescent display device according to any preceding claim, wherein the PIN diode serves to measure the light intensity output (100) from an associated display element and supply a signal to drive circuitry connected thereto to enable modulation of the light output in
10 accordance with the measured light intensity.